

### REMARKS

Applicant has amended the Specification to correct an obvious typographical error which was not earlier noticed. In Table 5, for Experiment No. 28, the dosage of the additive A as being "100 ppm" was inserted. As support for this amendment, all of the other entries 29-40 are shown at the dosage level of 100 ppm. It is believed that no new matter is introduced by this amendment.

Applicant has amended the claims to attend to housekeeping and to more clearly define that which the Applicant believes to be the invention. Application in proper form for examination. Claim 3 was amended to properly refer to the carboxylic acid component - -A- -. Claim 10 was amended to properly recite - - *a method for enhancing the lubricity of a middle distillate having a sulfur content of up to 0.05 % weight, the method comprising adding to the middle distillate an additive comprising* ...- - . Thus, claim 10 now properly recites a method with an active, positive step. It is believed that no new matter has been introduced by these amendments. Claim 1 and claim 10 were further amended to more clearly and distinctly claim the subject matter which Applicant regards as the invention. In claim 1, the amines were further described as having at least one C<sub>3</sub>-C<sub>18</sub> branched alkyl groups and wherein each of the branched alkyl groups has a secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. Support for this amendment may be found in Applicant's originally filed claims 7 and 8 and in paragraph [0023] (page 6, lines 1-7). New claim 12 further describes the mono-carboxylic acids of claim 10 as having an Iodine number greater than 40 gI/100g. New claim 13 further describes the dicarboxylic acids as being selected from the group consisting of dimer fatty acids, alkylsuccinic acids, alkenylsuccinic acids, wherein said dicarboxylic acids have a C<sub>8</sub>-C<sub>50</sub> alkyl radical. New claims 14 and 15 further describe the R1 of claim 1, and new claim 16 further describes the component A as further comprising resin acids. New claim 17 recites specific amine compounds found by applicant to provide exceptional results. Support for these amendments may be found in Applicant's Specification in the following numbered paragraphs: paragraph [0018] for claim 12, paragraph [0021] for claim 13, paragraph

[0023] for claims 14 and 15, and paragraph [0022] for claim 16. Support for new independent claim 17 may be found in Applicant's Specification in Tables 1-3. It is believed that no new matter has been introduced by these amendments.

Claims 3 and 10 were rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As discussed hereinabove, claim 3 was amended to properly refer to the carboxylic acid component, A, and the improper *use* language of claim 10 was amended to recite a *method* claim with an active step. Therefor the rejection of claims 3 and 10 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention should be withdrawn in light of the above amendments. The rejection of claim 10 under 35 U.S.C. §101 because the claimed recitation of a use without setting forth any steps involved in the process should be withdrawn for the reason that as amended claim 10 now recites an active, positive step which delimit how the invention is actually used.

Applicant's invention relates to additive compositions comprising salts of fatty acids with short chain branched oil-soluble amines which surprisingly provide enhanced lubricity to fuel oils with the particular advantage that the additive composition does not have to be heated before being added to the fuel oil and that the additive composition in concentrated or dilute form which remain homogeneous, clear and flowable at low temperatures. Prior to Applicant's discovery, additive compositions has to be heated or maintained at temperatures in excess of 35 °C in order for the additive to remain stable. By the term short chain branching Applicant refers not only to the carbon chain branching , but also the bonding of the amino group to a secondary or tertiary carbon atom in the alkyl radical. Particularly, the compositions of the present invention are primary, secondary and tertiary amines which have at least one C<sub>3</sub>-C<sub>18</sub> branched alkyl groups and wherein each of the branched alkyl groups have a secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. The additive compositions of the present invention remained flowable and clear for prolonged

periods at substantially lower temperatures such as to below  $-20^{\circ}\text{C}$ , while still providing an enhanced lubricity to middle distillate fuel oils. Applicant demonstrated this unexpected performance data in Table 3 wherein Applicant compared additive materials of the present invention (Examples 14-21) with additives that do not have Applicant's short chain branched structure (Examples 23-26). The additive compounds of the present invention remained clear and viscous fluids at  $-25^{\circ}\text{C}$  for 3 days, while additive compositions of the prior art became a waxy solid or a crystalline solid. In Table 5, Applicant demonstrated that the additives of the present invention (Examples 28-35) provided the equivalent or better lubricity performance than additives without Applicant's short chain branched structure (Examples 37-40). Similar results were shown in Table 6 for a different test oil.

Claims 1-11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364. Chandler discloses a method of enhancing the low temperature flow properties of fuels. Chandler is silent on any influence on lubricity. The Chandler method comprises adding to the fuel oil a heated additive concentrate. The heated additive concentrate comprises at least one nitrogen-containing derivative of carboxylic acid, an organic acid, and at least one other flow improver, wherein the concentrate is heated to at least about  $35^{\circ}\text{C}$  to avoid solidification. Chandler in column 2, lines 53-65 discloses that one of the components of the heated fuel additive concentrate is a nitrogen containing compound and that the nitrogen containing compound is generally from the reaction of a hydrocarbyl substituted amine with a hydrocarbyl acid having 1 to 4 carboxylic acid groups. Chandler further discloses that the hydrocarbyl groups of the amine, acid, and alcohol compounds include groups which may be straight chain or branched chain. Thus, one can only conclude that the Chandler reference is a broad disclosure of all of the possible combinations of an amine and a fatty acid with straight and branched chains of up to 40 carbon atoms in length, for use as a fuel oil additive. But, the Chandler reference does not disclose that its heated additive provides any advantage for improving lubricity of fuel oils without the additive being heated. The Chandler reference does not disclose Applicant's short chain branched

structure. Furthermore, as evidenced by Chandler's requirement for the heating of the additive concentrate, one skilled in the art would not be led to Applicant's particular short chain branched structure as described hereinabove for which Applicant demonstrated unexpected the low temperature stability results as discussed hereinabove. In fact, the Chandler reference can be said to teach away from Applicant's invention by its requirement to provide the Chandler additive as a heated composition.

EP reference 0798364 discloses a diesel fuel additive comprising a salt of a carboxylic acid and an aliphatic amine or amide obtained by dehydration-condensation between a carboxylic acid and an aliphatic amine. The fuel oil additive is disclosed to be combined into a diesel fuel to improve the lubricity of the diesel fuel. The Examiner further suggests that EP reference 0798364 does disclose similar compositions to Chandler and the EP reference discloses that such compositions improve the lubricity of low sulfur fuels. Thus, the Examiner is relying on the combination of the Chandler reference and the EP reference to show that Applicant's composition is obvious to one skilled in the art for the improvement of lubricity in fuel oils. Again, the EP reference represents a very broad disclosure of the combination of amines with aliphatic acids, without disclosing the specific structure of Applicant's additive as discussed hereinabove having a short chain branched structure. As discussed hereinabove, the Chandler reference does not disclose Applicant's particular short chain structure which Applicant has shown to provide unexpected both low temperature stability and lubricity performance in fuel oils. The EP reference does not disclose Applicant's short chain branched structure wherein the amines have at least one C<sub>3</sub>-C<sub>18</sub> branched alkyl group and wherein the branched alkyl group has a secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. There is no disclosure in the EP reference which shows any evidence of low temperature stability. All of the HFRR tests in the EP reference were carried out at 60°C, and there is no disclosure in the EP reference to suggest that the additive disclosed broadly in the EP reference is any different from the broadly disclosed heated additive of Chandler. Although there is a vast amount of

knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave. While analogy is at times useful, organic chemistry is essentially an experimental science and results are often uncertain, unpredictable, and unexpected. No one skilled in the art armed with the Chandler patent and even in combination with the EP reference would be motivated to select Applicant's specific branched, aliphatic amines with short chain branched radicals wherein each of the branched alkyl groups have at least one C<sub>3</sub>–C<sub>18</sub> group branched alkyl group and wherein the branched alkyl group has secondary or a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. And there is no suggestion that any compound within the broad range disclosed by both the Chandler and the EP reference would provide the solution to the problem which Applicant discovered which provided low temperature storage stability while still providing lubricity improvement to fuel oil compositions. Only in Applicant's specification is it disclosed that the compositions of the present invention are primary, secondary and tertiary amines which have at least one C<sub>3</sub>–C<sub>18</sub> branched alkyl groups and wherein each of the branched alkyl groups have a tertiary carbon atom or where the nitrogen atom is bonded to a secondary or tertiary carbon atom. The totality of the prior art disclosures would lead one skilled in the art **away** from the invention requiring a heated additive. The teachings are to be viewed as they would have been viewed by one of ordinary skill. It is impermissible within the framework of 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary for the full appreciation of what the reference fairly suggests to one skilled in the art. The reference all suggest that the additives improve fuel properties. No reference suggests that the additive is low temperature storage stable. Chandler requires heating of the additive, thus teaching away from low temperature stability, and the EP reference is only relied on to provide the lubricity property to essentially the same composition of the Chandler reference. The data provided by the Applicant clearly shows significant stability and storage advantages to the instant claimed invention. Proceeding contrary to

accepted wisdom is strong evidence of unobviousness. Therefore the rejection of claim 1, as amended, under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364 should be withdrawn for the reason that Chandler does not disclose the fuel oil composition or addition with specific short chain branched radicals bonded to the nitrogen atom in the primary, secondary and tertiary amines of the present invention and Chandler teaches away from the instant by teaching that the improver can be further enhanced by heating the concentrate prior to addition to the fuel to overcome a solubility problem. The EP reference is only relied upon to provide the inherent lubricity improvement to the broad range of materials disclose in Chandler. Applicant's showing of unexpected low temperature storage results for the particular compounds identified by Applicant, in the face of the Chandler reference teaching away from the instant invention is strong evidence of unobviousness. No one skilled in the art armed with either the Chandler reference or the EP reference would be motivated to select Applicant's particular compounds from the thousands of structures represented by the Chandler and/or EP disclosures.

The rejection of claims 2-6 and 9 under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364 should be withdrawn for the reasons given in support of amended claim 1, from which they depend.

The rejection of claims 10 and 11 under 35 U.S.C. 103(a) as being unpatentable over Chandler 5,755,834 and Applicant's admission concerning EP 0,798,364 should be withdrawn for the reasons given in support of amended claim 1.

New claims 12-16 depend from either amended claim 1 or claim 10 and should be allowable for the reasons given hereinabove. New claim 17 should be allowable in view of the reasons given in support of claim 1 and for Applicant's showing of unexpected results in Examples A-I in Tables 1-3.

Applicant is other than a small entity. The Commissioner is hereby authorized to charge to Deposit Account No. 03-2060 a fee for one additional independent claim in the amount of \$ 84.00 (Eighty-four dollars). The Commissioner is hereby authorized to charge any fee deficiency to Deposit Account No. 03-2060. A duplicate copy of this page is attached.

An early and favorable action on the merits is respectfully requested.

Respectfully submitted,



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